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ORANGE COUNTY AMATEUR RADIO CLUB

VOL. XXVIII No. 7

P. O. Box 3454, TUSTIN, CA. 92681

JULY 1987



*** JULY MEETING ***

COME ONE!! COME ALL!!...to the 'wine tasting & cheese' party to be held in place of the July meeting, at the QTH of Ken Konechy, HHC. Ragchew wid friends! Swim in the pool! Soak in the spa! Bring the harmonics...make an evening of it! Along wid the XYL, OM, & harmonics, bring some wine and/or cheese, towels, bathing suits, etc. We all had a gr-r-r-eat time last year! Come join us and enjoy! Find HHC's QTH from the map within, and we'll see you all at 2201 N. Eastwood in Santa Ana on July 17 starting at 6:30pm! (See map on P. 4).

RF

ORANGE COUNTY AMATEUR RADIO CLUB

JULY 87

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President	Jim Talcott	N6JSV	838-5395
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Member At Large	(Past President holds another position)		

CLUB APPOINTMENTS

Club Historian	Bob Evans	WB6IXN	543-9111
W6ZE Trustee	Bob Eckweiler	AF6C	639-5874
R.F. Editor	Bob Evans	WB6IXN	543-9111
Teen Representative	(open)		

CLUB FUNCTIONS

MONTHLY MEETING:

Jul 17th -Party-

| SPECIAL JULY MEETING |
|Cheese / Wine / Pool Party!
|At the Shack of Ken, W6HHC!

Aug 21st

SEE MAP - THIS ISSUE OF RF
At the usual DATE & TIME:
3rd Friday - 7:30 PM

Sep 18th

CLUB BREAKFAST:

1st Saturday of each month, 8:00AM at:
LE GRAND CAFE

Aug 1st

2525 N. Grand Avenue
Santa Ana, Ca. (714) 997-5393

Sep 5th

(1-1/2 blocks south of 22 FWY.)

CLUB NETS

BAND	MODE	DAY OF WEEK	LOCAL TIME	FREQ MHz	OPERATOR
2 Meters	FM	Wednesday	2100 hrs.	146.550	W6HHC
15 Meters	SSB	Wednesday	2000 hrs.	21.375X	AF6C
15 Meters	CW	Thursday	2000 hrs.	21.175X	WB6IXN
(Listen for W6ZE, net control)				XPlus or minus QRM	

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CLUB PARTY ON JULY 17th

*** ON THE NETS ***

6/3 15m phone net- W6ZE/IXN checks in ATU, NG7D, LAB, & Darrell, OVU. NG7D has been involved in a card game & checks in later. LAB broadcasts EZP's request for straight keys for the novice code class. He also wants crystals for the 40m band. ATU worked as a flight radio officer fer Pan American Airways in '46-7. OVU has a key he will loan to the novice class, & NG7D enlightens us on the 'Condor' 220 MHz repeater system. 6/3 2m phone net - W6ZE/AF6C checks in EZP, ATU, VKZ, JSV, NAX (Arden), ULU, NG7D. IXN listens on his converted 2m WX cube radio! EZP requests straight keys fer the novice class. ULU is mobile & finally fades away while talking abt the Orange County Fair display. RE plays the 'Westlink' tapes. NAX will report into the CW net on Thurs. eves. 6/4 15m CW net- W6ZE/IXN checks in NAX & LAB. NAX has been vacationing fer the past year & is looking fer another job as an engineering assoc. in electronics. LAB takes a nap but wakes up in time to get on the net! (one of IXN's favorite tricks, too!) NAX had chicken fer dinner & his fingers are sticking to the key (the answer to slipping keys, OM's!). We discuss the ant. ordinance in Mission Viejo & Arden's low profile ants. We had a great ragchew! Why not join us on the CW net fun on Thur. eves!! LAB reminds us abt need for keys fer the novice class. Donations anyone?? 6/10 15m phone net- W6ZE/HHC & AF6C are at NGO's shack. Other check-ins are: NGO, LAB, NG7D, ATU, IXN, COJ, BGX (Bill, El Toro), XO, & RE. Great check-in, OP's! NG7D completes his frame ant. BGX has weak sigs. RE locates Onyx peak fer IXN & NG7D. LAB has been busy wid code practice & rare DX. COJ now has tubes ATU wants. IBR informs XO that there is a hole in the bottom of his tent. XO informs the group OF A NEED FOR OP's FOR A MARATHON ON OCT. 18 & 19. RE's XYL's leg pains turns out to be arthritis. RE reads ARRL bulletin #45, concerning the 200th anniversary of the signing of the Constitution, and, info. on the CRRL's special call signs for cities in Canada during 1987-8. Also, Oscar 10 will be available for FD operation. IXN needs ceramic standoffs for a 2m collinear ant., and XO's XYL is still recuperating from a concussion suffered when she fell frm a horse. 6/10 2m phone net - W6ZE/HHC checked in ULU, RE, AF6C, NGO, NAX, NG7D, VKZ, ATU, & COJ. RE played the westlink tapes & ULU covered current Orange County Fair needs. HHC, AF6C, & NGO all operate frm NGO's shack, while IXN runs arnd the QTH, ant in hand, trying to hear all the OM's via his 2m WX radio! 6/11 15m CW net - W6ZE/IXN checks in John, LAB. NAX planned to be wid us (heard via 2m) but didn't make it. LAB explains a communications problem wid the tank farm, 3/4 mi. away frm the control point. IXN speeds code up slightly to give LAB practice. John copies perfectly! LAB will try fer commercial ticket in Aug.! 6/17 15m phone net- AF6C is gone on business & W6ZE/IXN checks in NAX, NG7D, LAB, KA6IOD, Mike, in Laguna Niguel. It's fun to meet new OP's on the net & we thank NAX fer having Mike join us! NG7D plays wid a new program 'Newsreel', on the Commodore. LAB copies CW WX services to improve his speed, & LAB requests 5 letter group 16 wpm code practice fer Thurs. CW net. IXN will provide the CW. EZP listens on the side & calls IXN wid gud news! He found the ceramic insulators fer IXN's new 2m ant! LAB & NAX discuss plexiglass and other acrylic resin substitutes fer ceramic insulators, that will resist UV attack! Tnx fer the info., guys! 6/17 2m net - Hope I don't miss anyone! HHC arrives late on the net. RE plays the 'Westlink' tape. NAX, VKZ, & NG7D are also in there! ULU joins us wid late news on Club participation in the Orange County Fair. 6/18 15m CW net - W6ZE/IXN checks in LAB, but no NAX! (Arden must have been napping agn!) LAB gives IXN a report on 2m net traffic and then IXN sends John a tape of 5 letter groups at 12 to 18 wpm. IXN sends further copy by bug & hand key (rusty copy, that is!). After net, LAB calls IXN fer copy check, which is almost perfect! 6/24 15m phone net - W6ZE/IXN checks in LAB, NAX, COJ, RE, & ULU. (Hpe I got everyone. I mislaid my net notes and can't remember what Elvira was up to in ULU's shack, crat it!!) FD was discussed, and, a tentative date for LAB's attempt at the commercial license! 6/24 2m phone net- W6ZE/HHC checks in AF6C, NAX, JSV, VKZ, & RE. Alex played Westlink tapes & FD was discussed. 6/25 15m CW net - IXN checks in LAB, ULU, & RND. RND is at the 8K level above Wrightwood, 90 miles away, fer FD! ULU will be marrying off his daughter,

Debbie, by Oct. LAB takes code practice, USB, by tape frm IXN's shack at end of net.

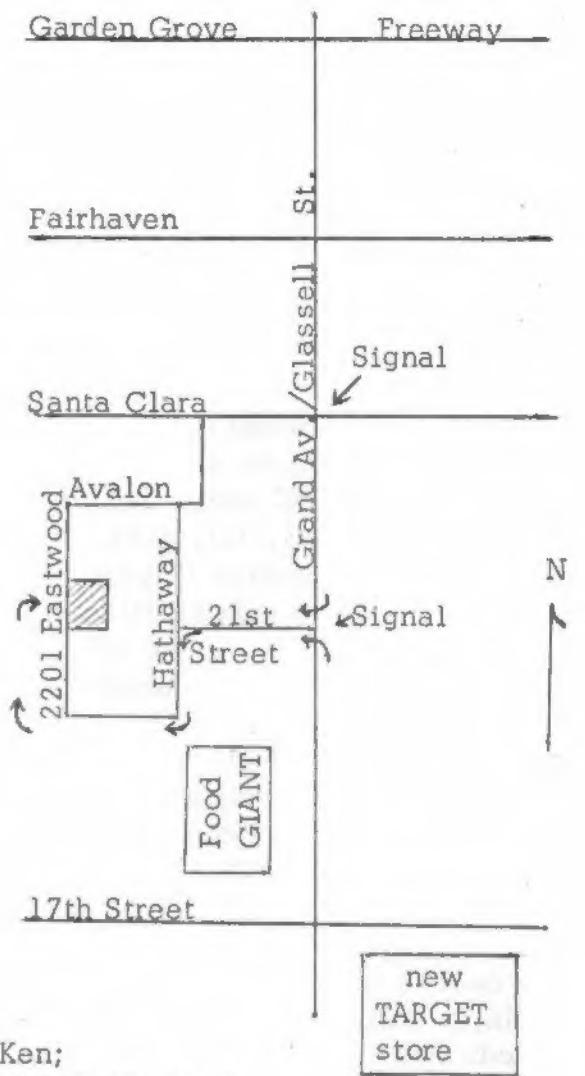
*** 'CONDOR' REPEATER INFO. FROM NG7D via WB6GPK ***

MAP TO HHC's QTH

All 'Condor' repeaters are accessed on 220+ MHz. They are linked on 420 MHz. Plans call for 4 repeaters to be added to the system. Sites & other info. will be released after installation. WB6GPK has installed a 'Condor' repeater on Tepesquet Peak at 3.253 Kft elevation, on 223.94 MHz., outside Lompoc, CA. (This repeater was not covered in July 'RF'). The 'Condor' system will create a link on 220 MHz. between San Diego & San Francisco, and across the desert to Las Vegas, Nevada. NG7D estimates 25W (maybe less) would allow Santa Ana and vicinity to access the Frazier Mt. repeater, input 220.50 MHz. We take this opportunity to thank OP's like GZK, KDM, IYY, RHQ, AA4ID, BGK, GHY, TLG, & DOI for their hard work, diligence, and funding of the 'Condor' system, which will help insure preservation of our favorite frequencies! Our hats are off to you, guys!!

*** THE FIELD DAY GANG ***

We all had another great Field Day! Special thanks goes to Jane Watts (n0ne), and Dave, COJ, for taking care of all the hungry mouths; also to the set-up and take-down crews, without which Field Day could not exist! OP's and visitors who signed the roster were: W6TA, Bob; EZP, Ron, & Trudy, & harmonic; AF6C, Bob; Jane, N0NE; IXN, Bob; IBR, Al, & Dottie, IBP; NGO, Kei; WA6FIT, Ron; WZO, Fried & Sandi, WZN; LAB, John; HHC, Ken; N6UC, Jack; KG6OK, Herb, & KB6GFT, David; KD6XO, Bob; WA1ZCQ, Karl, frm N.H.; VKZ, Frank; Karl Klos (no call YET!); VQL, Dick; JSV, Jim & Jeanie, EZS; and OCARC members frm the novice/tech class: Trudy Toering, Mark Stanford, Jim Moorehouse, and Rich Grigg (nice to have U wid us, future OP's!); WA6SOJ, Dan; W6COJ, Dave; ETK, Leland; K1YZG, Lu, frm Irvine; and Art, W6IAT, frm Corona Del Mar. Tnx agn, gang, fer another wonderful FD!! We all wondered where Alex, RE, had gone fer FD! On Monday, JSV informs IXN that Alex suffered a stroke & was in Western Med. Center fer FD. To our knowledge, RE has been to every FD since before 1964!! Get well soon, Alex! We missed ya, OM! Too bad Chris, KA6IMP, cud not be wid us on FD! But, if one must miss FD wid the Club, what better place to spend it than in the south Pacific! If you were not radio-silent, & you worked FD, Chris, how many points did you total?! The Club's novice class was well represented at FD! Trudy, Mark, Jim & Rich spent much time at JSV's station working and logging, and providing much support to FD setup and operation. Tnx, future OP's!!



*** G O O D G R O U N D S ***

A misleading idea of a good "ground" is a section of iron pipe driven into the earth with a wire connected to the electrical circuit (Fig. 1). This may, or may not, be a suitable low resistance path for electric current to protect personnel and equipment. Does your ground look like this? (FIG. 1)

Twisted connections, no clamps a real rats nest. Its a good RF mixer when corroded and causes all kinds of problems including interference from signal mixing and reradiation. A Good ground is not always easy to obtain. Experience gained by others is valuable to you in evaluating a reliable system. Earth resistivity has an important bearing on the effectiveness, as does the depth, size, and shape of the electrode.

The tips here apply to all area requiring a good ground system. This includes home service entrance grounds, and any other use of electricity. Unfortunately the ground systems for home electrical systems are NEVER checked. Inspectors never include ground tests for home installations. Few inspectors have either equipment or knowledge of how to check a ground system.

Section 250-84 NATIONAL ELECTRICAL CODE, a single electrode consisting of a rod, pipe, or plate which does not have a resistance to ground of 25 ohms or less shall be augmented by one additional electrode of any of the types specified in Sections 250-81 or 258-83.. Note these Sections refer to several types of ground including rods, pipes, and plates. IN FACT OFTEN AN ADDITIONAL GROUND IS NOT SUFFICIENT.

WHAT CAN CHANGE GROUND RESISTANCE

No general rule is useful for all cases of determining a GOOD Ground.

- When a facility is altered or enlarged, different grounding may be needed. What may have been a good ground is now "Obsolete".

- As more non-metallic pipes and conduits are installed underground, such installations become less and

less dependable as an effective "ground".

3. In many areas, the water table is gradually falling. In a year or so, ground electrode systems that once were effective may become one of dry earth and high-resistance.

This emphasizes the need for a periodic check of the ground resistance. Testing upon installation alone is not enough.

WHY A GOOD GROUND?

- To limit voltage to earth potentials for an entire electrical system.

- Grounding of enclosures and structures to the safety of people and their contact with such items.

- Protection from friction generated static electricity.

- Direct lightning stroke protection.

- Induced lighting voltage protection.

- Interference protection to electrical process control and communication equipment.

Let's define GROUNDS. As early as 1918, the terms GROUND, PERMANENT GROUND, GROUND CONNECTION were defined to mean "electrical connections intentionally made between electrical bodies (or conducting bodies in close proximity to electrical circuits) and metallic bodies in the earth--such as rods, water pipes, plate or driven pipes."

A Metallic body in earth is often referred to as an electrode even though it may be a water pipe system, buried strips or plates, or wires. A combinations of metallic bodies are called a grid. The Earth Resistance we are concerned with is the resistance to current from the ELECTRODE into the surrounding earth.

GOOD GROUND PRACTICES

- A single ground is generally not good protection. Multiple grounds with radials are about your best bet. You often hear that ground rods need not be driven straight down into the ground. This may or may not

be useful. The reason lightning travels on the surface is the usual presence of moisture in the top soil making it more conductive. Doubling the length of a ground rod will reduce its resistance to the earth by about 40%.

2. All feed lines and control cables should be as near the ground as possible. DO NOT PUT THE CABLES IN METAL CONDUIT. UNLESS YOU HAVE THE END ABOVE GROUND IN A JUNCTION BOX. HERE IS WHERE THE LIGHTNING WILL USUALLY BURN THEM OFF WHERE THEY ENTER. The entry point to the box or the conduit is the same as a shorted turn on a transformer and the lightning will jump here. In some locations this may be useful since it might limit entry into the HAMSHACK. You make up your own mind.

3. Multiple Grounds some distance away, 6 feet or so, will reduce the ground resistance by about 40%.

4. Guyed towers have dual benefits:

a) The guy wires are essentially inductors in parallel and this reduces the overall inductance significantly. This therefore reduces the impedance of the tower to ground. As you are dealing with a steep wave from a lightning discharge it has the effect of behaving like an alternating current. (Fig. 2 ASB). I have included the equation for inductances in parallel on fig. 2B.

b) The multiple guys also result in the effect of multiple grounds lowering the overall resistance.

5. The coax should be grounded at the base of the tower.

6. The conductors for grounding should be either solid wire or copper strap. DO NOT USE Braid or Stranded Wire. It develops high inductance from the multiple skin effect.

7. Mounting an antenna on the side of a metal structure is not insurance against lightning damage. A metal arm above and below such antennas will greatly reduce the probability of damage. (Fig. 3)

8. Avoid the use of dissimilar (different) metals for connections. If copper and the galvanized parts of

a tower touch you have galvanic corrosion. That is to say that the junction when wet acts like a battery in your flash light and one of the electrodes will be corroded with a loss of connection resulting.

9. Ground the outer braid of all coax at the base of the tower. Do this as near the ground as possible. The opening in the jacket here will also prevent condensation buildup in the coax between the braid and jacket. Be careful how you connect. The insulation melts easily!!!

10. Do not make any sharp turns with any grounding conductors. A radius of 12 inches in a conductor is not unreasonable. The sharp turn acts like an inductance or shorted turn. (Fig. 4)

11. Any other protection may be useful, such has lightning gaps for coax lines.

12. Clamps are not a GOOD means of connecting the ground wire or wires to the ground rod!!! You should Properly BRAZE or SILVER SOLDER the heavy conductor (solid wire) to the ground rod. It is often useful to use a clamp ABOVE the brazed joint near the top end of the rod. Clamps alone usually are a different metal and corrosion prevents a good long term connection.

13. It is better to add spaced rods to the existing power line ground and then run any ground from the interior of the house to this common point. The telephone company used the power line ground also.

IMPROVING A GROUND SYSTEM

If the resistance is too high with a single ground you may improve it by:

1. Use Multiple rods.
2. Use multiple rods with buried radial wires.
3. Use an longer rod or rods
4. Treat the soil

CHANGES FROM ROD DIMENSIONS: Driving a rod deeper into the soil materially decreases its resistance. In general DOUBLING A ROD LENGTH REDUCES THE RESISTANCE BY ABOUT 40%. Table I will give an idea of the change in rod depth.

TABLE I
EFFECT OF GROUND ROD DIMENSIONS

MEASURED OHMS	ROD DEPTH FEET
160	.9
140	1.0
120	1.3
100	1.8
80	2.4
60	3.3
40	5.0
20	12.0

You may think that the rod diameter has a large influence. However, doubling the diameter only decreases the resistance by about 10% a deep ground bed would be much better.

USE MULTIPLE RODS: Two spaced rods will give a parallel path similar to two resistors in parallel. This not exactly the case but useful. The reduction for two rods of equal dimensions result in about a 60% reduction in resistance. Three rods the reduction is 40% and four about 33%. Thus we see the use of multiple rods is very useful. THERE IS A NOTE OF CAUTION HERE!!! USE ONLY ONE COMMON POINT TO ALL THE GROUNDS. Failure to do so may result in all sorts of complications. The rods should be spaced at least as far as they are deep and doubling their spacing will increase the reduction of two rods from 40% to 50%.

CHEMICAL TREATMENT: May be useful but has many deterrent factors.

1. In some sandy soils it may disappear with surface water dissolving and taking it away.

2. How the treatment is applied. A deep trench should circle the ground rod about 1 foot away about two feet deep and filled with several hundred points of a cheap salt. Oh yes it could corrode the ground rod out of existence.

3. The seasonal variations can result in a variation of tenfold.

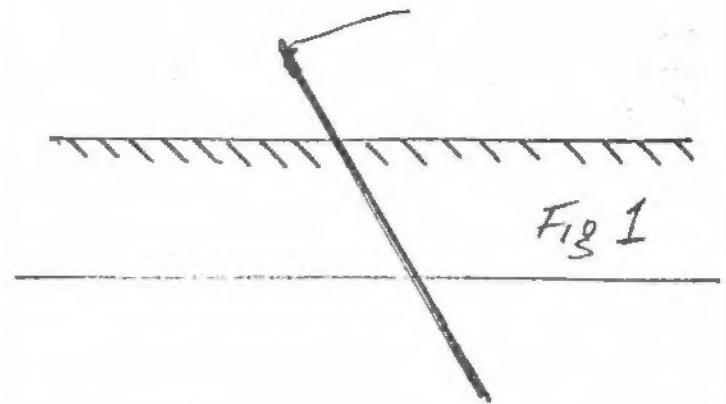
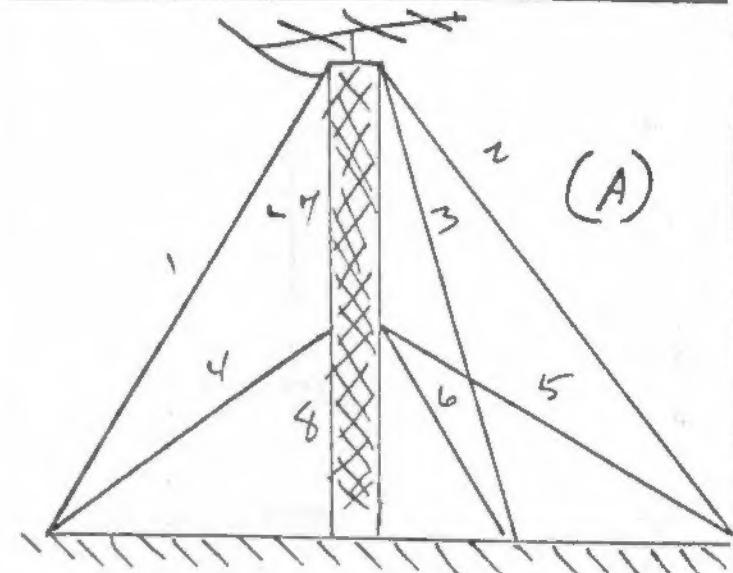
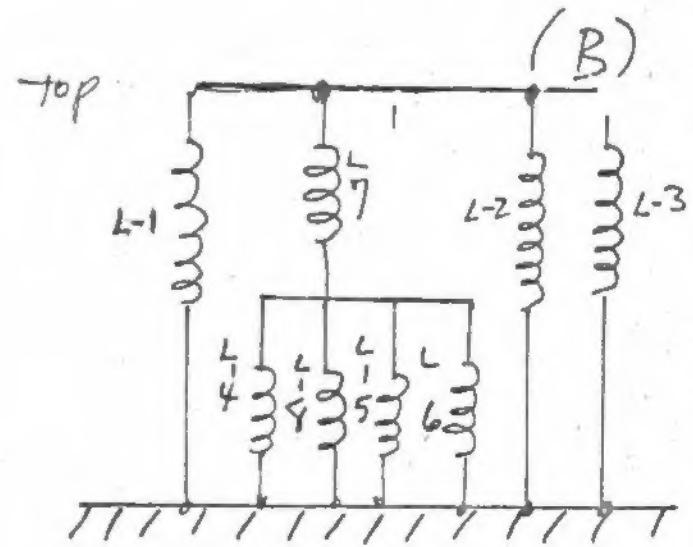


Fig 1



(A)

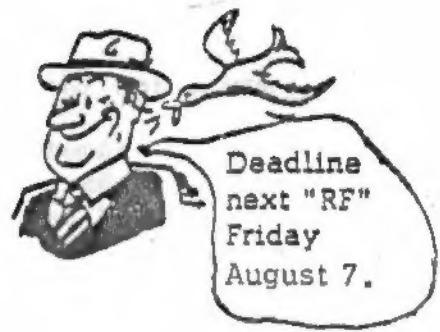
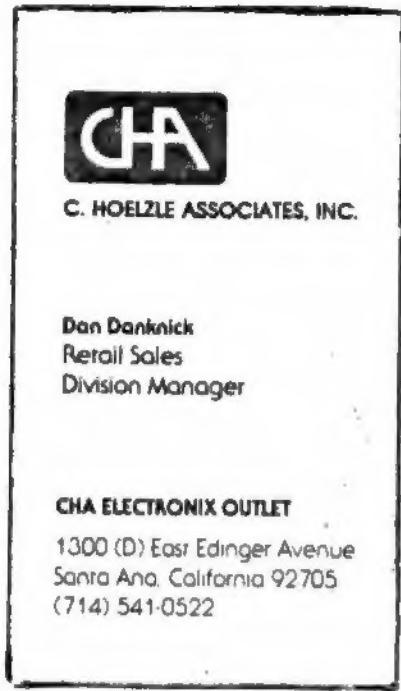


(B)

$$L_{TOTAL} = \frac{1}{\frac{1}{L_1} + \frac{1}{L_2} + \frac{1}{L_3} + \frac{1}{L_4} + \dots}$$

Fig 2

frm Ray Sine, W3JIW via CARS 'Crawford Key'



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